M.A.P.L.E:
Modular Automated Plant Life Enclosure

1. Idea

An all-in-one automated plant growing device. This device is a modular enclosure that allows the user to put in their plant in as-is with a pot of their choosing to automate the growing process. The device would automate the lighting and watering, features climate control, and comes with an application that grants the user remote access to the device. The app would also give additional data on the current status of the plant.

The modularity comes from the fact that the enclosure will be made out of modular tiles that the user can put together on their own. This will also allow them to expand the enclosure as the plant grows, which is usually the case. In addition, the user can remove the enclosure on-demand when, for example, the temperatures are higher during summer.

2. Research findings

2.1 About users

M.A.P.L.E caters to plant hobbyists, enthusiasts, and casual growers. At first, we conducted research by distributing questionnaires on Facebook and Reddit to house plant growing communities, yielding 40 responses, which served as a solid foundation for our interview questions.

We interviewed 5 people in total, ranging from super casual growers that don't want to spend their time caring for the plants to very active plant growing hobbyists.

The first and second interview was conducted as a group interview with 2 interviewees. One of them was a casual hobbyist and the other one had a bit more knowledge in the field as she had worked with plants professionally and is currently using a hydroponic growing kit for herbs in the kitchen.

The third interviewee was a student from Helsinki University. She is a casual house plant grower. She has 8 small house plants and a few chili plants. They use a grow light and heated plant propagator. They express interest in new technology for plant cultivation, but may not be willing to invest effort in using it.

The fourth interviewee was a casual plant grower with just one cactus, while the fifth was a middle-aged enthusiast who owned around 10 plants.

From the 5 interviews, the key takeaways were:

- Automated watering is the most wanted feature
- The device should be intuitive and easy to use
- The use of one's own pots should be allowed
- The ability to resize is important
- Pests and mold is a concern
- For more casual people, just an automatic irrigation system could be more suitable

2.2 Use contexts

The first use case for M.A.P.L.E is the casual user who does not like to take care of their plants. With the device, the plant-caring process can be fully automated and the user can save time for other tasks.

M.A.P.L.E also offers customizability for the plant enthusiast who needs really specific requirements for their plants/herbs. The remote control and humidity tracking enables herb growers to customize the environment to suit their plants' needs.

With its remote control ability, M.A.P.L.E also allows the user to remotely take care and monitor their plant condition from anywhere in the world. This is especially helpful for busy business people who are constantly traveling away from home.

The system is also highly scalable due to its modularity. Therefore, different users can adjust it according to their needs. Our user can be anyone from a casual plant grower with just a few plants to a highly demanding herb growers with many specific requirements for their herbs. M.A.P.L.E has something to offer everyone.

3. Technical aspects

M.A.P.L.E contains a closed-loop humidity and temperature control system, as well as an automated watering system. It also contains a built-in grow light, which is controlled by a light sensor to compensate for lack of ambient light.

The device is also connected to the internet through a Raspberry Pi, allowing the user to have remote access to it via an app, where they may manually adjust the ideal temperature, humidity, and watering levels, and may also check on the plant through a camera that is integrated into the enclosure. The application also has a database that gives expert recommendations on how to take care of different plant species.

4. Other concepts

Other concepts that were considered were:

- Plant sensor kit

A portable device that tracks the soil humidity, air humidity, and temperature of a plant. It is connected to a mobile app, which allows the user to set notification triggers based on the sensor readings.

We decided against this idea as it was too generic, and M.A.P.L.E essentially builds upon this idea by adding feedback systems.

- Automated plant enclosure

A standalone device that allows the user to plant a crop directly into an included custom pot. Has the same features as M.A.P.L.E, without the modularity aspect.

We decided against this idea after completing the interviews, as it was made apparent that the target users for this product (people who wanted plants for aesthetic value) would simply get a low-maintenance plant or an artificial plant in the first place. Furthermore, it seemed that users who wanted to grow plants preferred to use their own pots and mentioned that the fixed size would be a limitation, thus the introduction of the modular system for M.A.P.L.E.